8

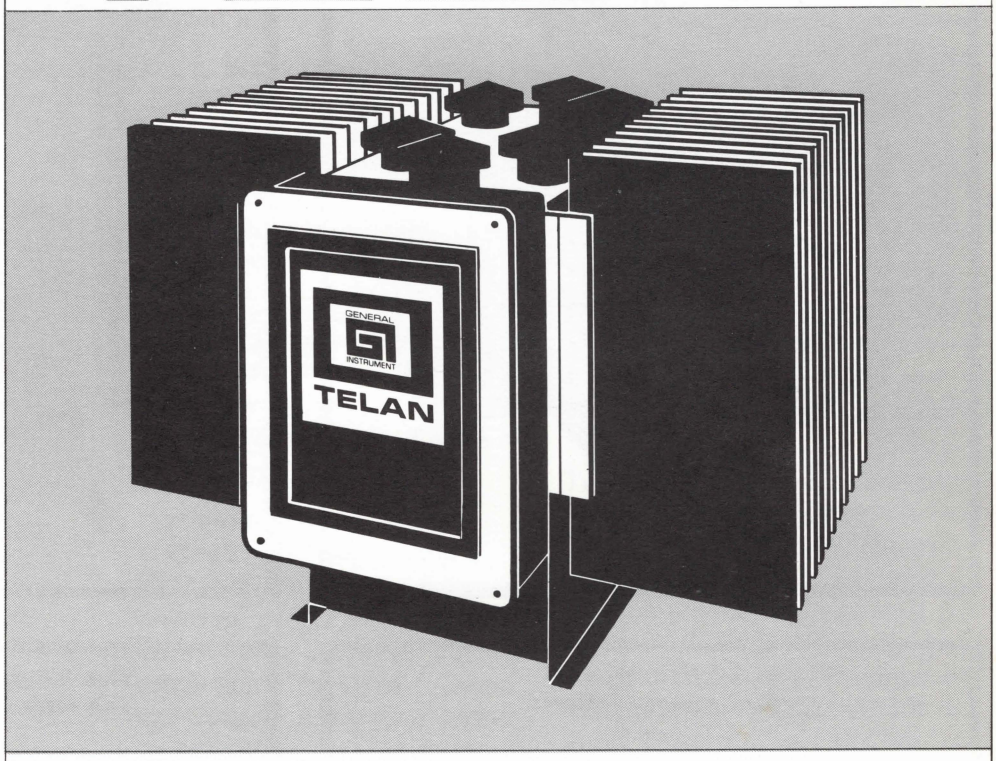
RECTIFIERS
SIGNAL

New!

HIGHER POWERED

GENERAL INSTRUMENT

TELAN®



THERMOELECTRIC GENERATORS

FOR RELIABLE REMOTE POWER

GENERAL INSTRUMENT

GENERAL INSTRUMENT CORPORATION
THERMOELECTRIC DIVISION

Pat. Pend.

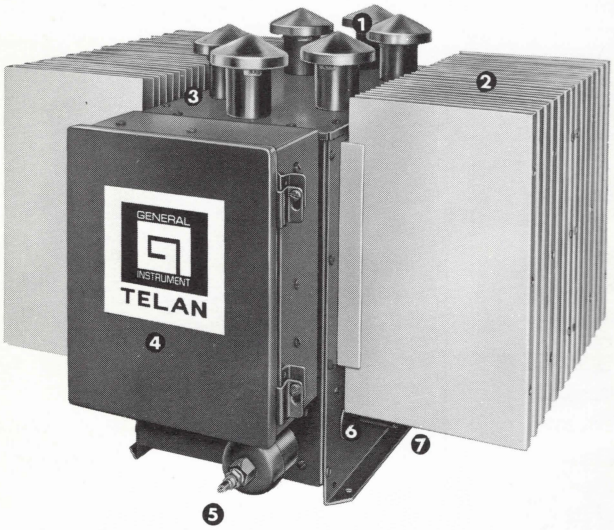


Figure 1

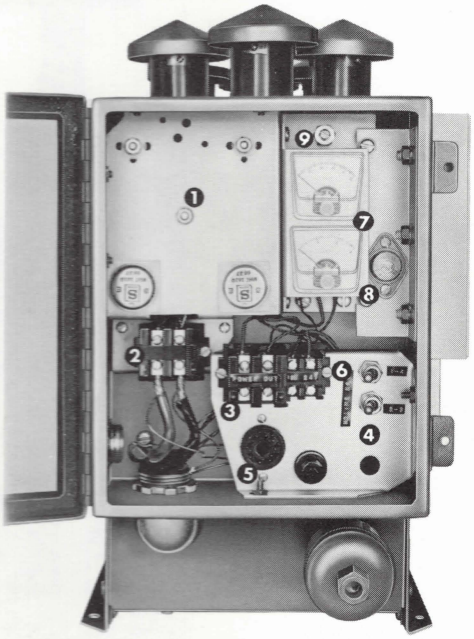


Figure 2

GI TELAN-U4P, showing important external features.

1. "COOLIE HATS" over intake and exhaust ducts (Identical to prevent wind induced pressure differences)
2. Heat rejection fins
3. Weather tight housing
4. Weather tight electrical box (See Fig. 2)
5. Gas connection (Filter mounted externally)
6. Contains:
   - Air intake plenum chamber
   - Gas regulation and manifolding
   - Electrical harnesses
7. Mounting base

View into weather tight electrical box with cover open.

1. DC-DC converter*
2. Terminal strip allows open circuit voltage measurement
3. Power output
4. Ignition switches*
5. Readily accessible test points for monitoring individual module performance
6. Convenient tie point for ignition power source*
7. Voltmeter* and . . .
8. Ammeter* are standard accessories (Can be field installed)
9. Variable voltage limiter* adjustment screw

*optional items.

©1967, General Instrument Corporation

DESCRIPTION:

GI TELAN generators are highly reliable, long-duration sources of electric power (1 to 300 watts for periods up to 5 years) in remote locations. They fill a need not met by batteries or engine-driven generators.*

TELAN generators convert heat from the combustion of propane, butane or natural gas directly into electricity by thermoelectric means, a very simple and, therefore, reliable source of electrical energy. The design emphasis in the TELAN line is on *reliability* in *remote locations* at *low costs*. The listed features demonstrate this design emphasis.

FEATURES

1. CATALYTIC BURNING
(PROPANE, BUTANE AND **NATURAL GAS**)
Since there is no flame, flame-out problems are eliminated. Fuel or air flow can be interrupted for 3 minutes and the combustion will continue spontaneously when system is restored.

2. MATCH OR ELECTRIC IGNITION
No longer is battery power required for ignition. Electrical ignition is optional for remote starting.

*Consider TELAN s to be watt-*year* energy sources, batteries watt-*hour* sources and engine generators *kilo*watt-hour devices.

3. NO MOVING PARTS
Fuel is injected by its own pressure thru a jet into a venturi, which ingests the needed air.

4. ALL SOLID-STATE ELECTRONICS
The thermoelectric power generating modules and the DC-DC converter transistors are all highly reliable semiconductor devices.

5. COMPLETELY WEATHERPROOF HOUSING
Weatherproof housing is standard for all TELAN generators.

6. OPERATE CONTINUOUSLY
TELAN units produce a constant power continuously, eliminating failures due to components required to sense and control a varying power output. (For varying loads, a small storage battery supplies the demand power; the TELAN unit supplies average power).

7. MODULAR CONSTRUCTION
You need buy only as many identical power assemblies in single housings as required. You never buy more power than you need.

8. SIMPLE OPERATION
TELAN units can be operated by unskilled personnel. Maintenance is also very simple; no special training required.

WHEN TO USE TELAN GENERATORS

TELAN generators are the lowest-cost source of reliable remote power when:

1. Power level is between 1 and 300 watts.
2. Power is required for at least 3 months.
3. The location is remote (at least ¼ to 1 mile from a power line).
4. Reliability is a prime consideration.

To make conservative comparisons with other power sources under consideration, estimate the costs for a TELAN unit at $350.00 plus $20.00 per watt for initial costs and $3.60 per watt-year for fuel (use average power consumption, not maximum demand power). The units will require no regular maintenance, so maintenance costs are negligible.

In most cases the economic cross-over with primary batteries is between 1 and 2½ watts and with engine generators at 200 to 500 watts.

TELAN units are seldom economically justifiable at less than 3 months operating time but at times longer than 3 months and in 2 to 300 watt range, they will be the least expensive power source.

Power lines cost from $1,000 to $10,000 per mile, depending on terrain. Therefore, in some cases a TELAN unit could save costs if only ¼ mile from a power line.

(continued)

Beyond 3 or 4 miles a TELAN unit should always be considered.

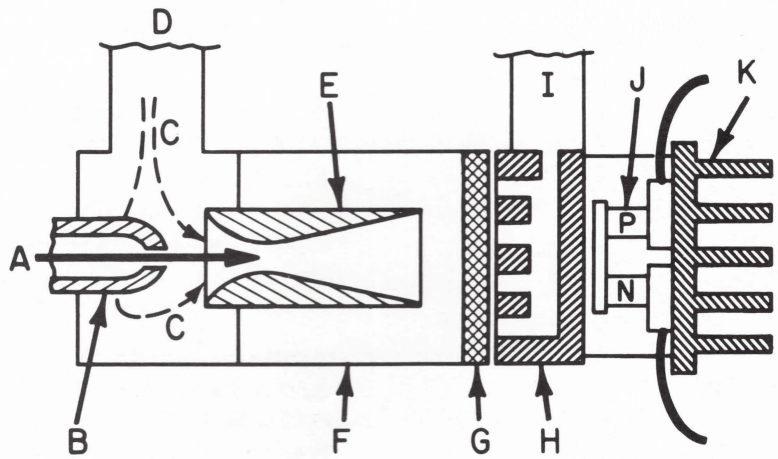
For reliable power on buoys and floating platforms, ask for GI literature on the TEMAR series of thermoelectric generators.

For cathodic protection applications, ask for GI literature on the DECAP series of thermoelectric generators.

HOW GI TELAN UNITS WORK

The thermocouple effect, also known as the Seebeck effect, has been known for over 150 years. This states that a voltage will be generated when one junction between two dissimilar metals is hotter than the other junction. This effect can be enhanced by using carefully chosen semiconductor materials instead of metals. The generated voltage is proportional to the temperature difference between the cold end and the hot end of the short semi-conductor bars.

Heat to maintain this temperature differential comes from the combustion of propane, butane or natural gas; by a low temperature, catalytic process, which is extremely stable and safe (in completely enclosed chambers with long intake and exhaust manifolds). See Figure 3.



Flow of low pressure propane, butane or natural gas (A) through jet (B) draws primary air (C) from intake manifold (D) through venturi (E). Air and gas enters totally enclosed mixing chamber (F) and impinge on catalytic bed (G) where low temperature oxidation and heat release occur. (G) is very close to hot plate (H) which also has passages through which the hot gases pass before exhausting through exhaust pipe (I). The hot plate raises the temperature of one side of the thermoelement (J). The other side is cooled by the heat rejection fins (K).

Figure 3

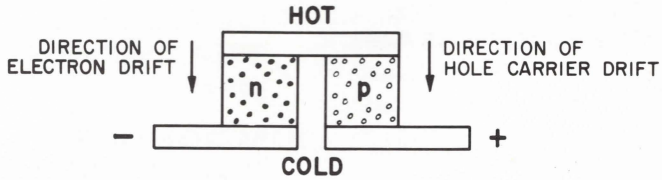


Figure 4

In the "n" leg of the thermocouple (See Figure 4) the excess electrons on the hot side will have higher kinetic energy than those on the cold side, thus the "hot" electrons will drift toward the cold side, carrying with them a negative charge. The cold end becomes negative relative to the hot end.

In the "p" leg the hole carriers will, in a similar manner, drift toward the cold side, imparting a positive charge. When a bus is connected across the two legs as shown, the voltages add.

In a TELAN generator many such n & p legs are connected in series to give a more useful voltage from each thermoelectric module.

AVAILABLE TELAN UNITS

Standard TELAN generators consist of one thru nine *identical* burner-thermoelectric element-fin modular assemblies in a single housing. The outputs of these units with all modules in series are shown under columns headed "without converter" in Table 1. (see page 8)

All units are available with DC-DC converters to provide 12, or 24V outputs (see column headed "with converters").

Higher power levels (limited only by your economics, space available and fuel handling problems) are achieved by connecting standard TELAN generators in series and using the output directly or thru a single converter. TELAN units with converters should not be used in series.

The ratings of TELAN-A series generator (without converters) are:

Power—the sum of power ratings of units in series.

Voltage—the sum of voltage ratings of units in series.

Current—same as for individual units.

Assume converter to be 80% efficient. Therefore power output of TELAN-A units in series operating thru single converter is .8 times sum of their power ratings.

*See also "Telan Application Handbook" TEG-12.

Please consult TELAN engineers or representatives* for help if your power requirements cannot be met by either a standard unit or several connected in series.

BUILT-IN "CIRCUIT BREAKER"...THE PELTIER EFFECT:

When a current is passed through a thermoelectric material it will pump heat from one surface to the other. This is the Peltier effect and has been used in thermoelectric refrigeration. When current flows through a thermoelectric module in a TELAN generator the Peltier effect pumps heat, in proportion to the current, from the hot side to the cold side. This reduces the ΔT, which reduces the generated voltage, which in turn reduces the current. Thus it is impossible to damage a thermoelectric module with an overload — it actually runs safely with a short-circuited output. Thus, it is better to "idle" a TELAN with a short circuit rather than an open circuit. Since there is no heat pumping at open circuit, the module will run hotter in this condition. TELAN generators are carefully designed to run safely even in open-circuit conditions.

TELAN APPLICATION NOTE*

TELAN units are designed to supply constant power continuously. Therefore, except for steady loads, a storage battery is a normal part of a TELAN energy system. It supplies demand power for intermittent loads and is a simple voltage regulating device for varying loads. The equivalent circuit for a TELAN unit charging a battery and with a load is shown in Figure 5a. The load R_L could typically be intermittent. Note that this circuit can best be analyzed as a separate charging circuit (Fig. 5b) and discharging circuit (Fig. 5c). The rectifiers in the DC-DC converters prevent battery discharge thru the generator when output voltage is lower than battery voltage.

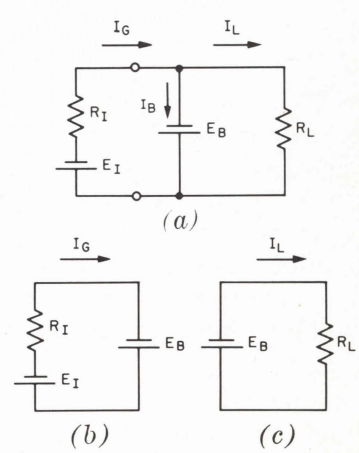


Figure 5

TELAN INSTALLATION

All TELAN generators are intended for use outdoors and require no additional housing. They can be used in housings or shelters with caution — there must be sufficient cooling of the heat-rejection fins and provision for eliminating gases that may accumulate. Low temperature operation is limited by fuel vaporization. Normal maximum temperature is 120°F in still air (up to 155°F if unit is derated approximately 25%). A sun shade is advisable in hot environments that also have long periods of direct solar-radiation heating.

Mounting dimensions are given in instruction book supplied with each TELAN. Since there are no moving parts, the mounting platform is designed for static loads only. Overall dimensions and total weights are given in table 1. A raised platform is preferred; it allows better cooling and protects from flooding in low-lying areas in heavy rains.

For marine exposures such as in beach areas or offshore platforms, TELAN units are available with marine hardware. This includes all stainless steel-fittings, extra anodizing of the aluminum housing and a marine epoxy paint.

A simple adjustment of the internal pressure regulator is required for altitudes above 1,000 ft. Full instructions are given in instruction book. A special regulator which regulates absolute instead of gage pressure is available for units that will be used in varying altitudes.

FUEL SUPPLY

Propane and butane tanks should have regulators at or very close to the outlet valves to reduce pressure to 10-30 psi in piping to generator. Butane should be used only where temperature will not go below +35°F for long periods. If propane is to be used in environments below −35°F special provisions for keeping it warm (bury in ground or snow, or use excess heat from TELAN unit) must be included. TELAN engineers and local LPG suppliers can assist you.

All normally available natural gases can be used in the natural gas series TELAN generator. Pressure at the gas input should be 10-30 psi. The gas should be dry, clean, and especially free of dirt or sand particles and sulphur. Well gas should be filtered and scrubbed.

ELECTRICAL CONNECTIONS

All electrical connections are made to screw terminals inside a weather-tight electrical convenience box mounted on the front of TELAN units. A weather-proof fitting is provided for wiring that will pass out of this box.

OPERATION AND SERVICE NOTES

TELAN units are so simple they can be operated by unskilled personnel. Once properly installed, only willfully wrong action can damage the units.

MATCH IGNITION

TELAN "U" series are ignited by holding a match to each exhaust stack. This starts a flame immediately above the catalytic bed, heating it. When the bed reaches catalytic reaction temperature, catalytic burning starts in the bed and it heats more rapidly. Finally all the fuel is burned in the bed and the flame goes out. From a cold start this takes 15-20 minutes.

ELECTRICAL IGNITION

The TELAN optional electrical ignition requires approximately 30 watts per burner for 15 sec at 12 or 24 V. This heats a glow plug which starts a flame in the same manner as match ignition. TELAN units with electrical ignition can also be started with a match.

SERVICE

The only regular servicing required is refueling.

We expect that TELAN units will normally operate 5 years without maintenance or failure but in some cases maintenance will be required.

If the gas supply is known to have been dirty, the filter should be replaced. The size of the gas jet is important, thus, dirt or corrosion could affect the size of the opening. This jet can easily be replaced in the field by disconnecting the gas line and removing one cotter pin. In the unlikely event of other failures, we recommend that the entire burner-thermoelectric element-fin assembly be removed and replaced with a new assembly. The TELAN remains in service while maintenance is performed on the removed assembly.

Therefore, the only spares that would be needed are filter, jet and possibly one complete assembly.

NOMENCLATURE

The GI TELAN line of thermoelectric generators is identified by a simple and useful nomenclature system.

GENERATORS

TELAN-U4P

- P — Indicates fuel jets to be used, P for Propane; B for Butane; N for Natural gas
- 4 — Number of thermoelectric generating assemblies in series in single housing
- U — Universal catalytic burner
- TELAN — *T*hermo*E*lectric generator for remote *LAN*d based use.

CONVERTER-LIMITERS

UC-4-12

- 12 — Nominal output voltage; 12 V limiter range 12-16 V; 24 V limiter range 24-31 V
- UC — Converter rated for input from TELAN-*U4*N, P or B generator

HOW TO ORDER

1. If power requirement can be supplied from units listed in table, specify by part number. If with converter-limiter, indicate 12V or 24V, and if optional volt and ammeters or electrical ignition are desired.

2. If power level is higher than listed units, first see page 4 on how to operate units in series for higher power output; or if you desire, specify following requirements and GI engineers will suggest a suitable system:

   Voltage

   Steady load power

   For intermittent loads, "on" power and duty cycle

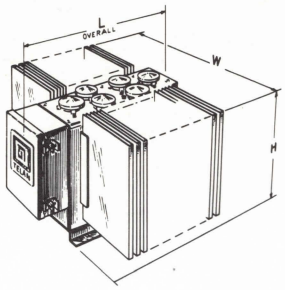
   Environmental temperature range

DELIVERY

Listed units can usually be shipped in 4-6 weeks, some are "off the shelf" at 1 week delivery. Specials require 6-10 weeks. Shipments are made from our plant in Hicksville, L. I.

WARRANTY

All information contained herein is accurate to the best of our knowledge but the accuracy of test and application data cannot be guaranteed and the following is made in lieu of all warranties, expressed or implied. Thermoelectric generators and converters are guaranteed to provide rated power for one year after the date of purchase, provided the units are not overheated, physically damaged beyond normal wear and tear or disassembled without permission from seller, and the Thermoelectric Division of General Instrument Corporation is immediately notified of the failure. Seller's and manufacturer's only obligation shall be to repair, adjustment or replacement of units proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage direct or consequential, arising out of the use of or the inability to use the product. The user assumes the responsibility for the use of the product. No other statement shall have any effect unless signed by an officer of General Instrument Corporation.



SPECIFICATIONS *Table 1*

ELECTRICAL SPECIFICATIONS								FUEL					Size & Weight			
Without Converter				With Converter (3) (5)				Propane & Butane			Natural Gas					
Generator Model	P(2) Watt	E Volt	I Amp	Converter Model	P(2) Watt	E Volt	I Amp	W-hr/lb(4)	lb/Wk	$/Yr	W-hr/MCF(4)	MCF/Wk	H In	W In	L In	Wt Lbs
TELAN-PA1	6.2	.65	9.6	PC1-12 PC1-24	4.2	12 24	0.35 0.18	130	8.2	20			17	11	18	28
TELAN-U1P(1)	9	.90	10	UC1-12 UC1-24	6.5	12 24	0.54 0.27	140	11	29	3000	.5	17	11	18	28
TELAN-U2P(1)	18	1.8	10	UC2-12 UC2-24	14	12 24	1.2 .6	140	22	55	3100	1.0	17	23	13	42
TELAN-U3P(1)	27	2.7	10	UC3-12 UC3-24	21	12 24	1.8 .9	145	31	81	3100	1.4	17	23	21	58
TELAN-U4P(1)	36	3.6	10	UC4-12 UC4-24	28	12 24	2.4 1.2	150	40	110	3300	1.8	17	23	21	73
TELAN-U5P(1)	45	4.5	10	UC5-12 UC5-24	36	12 24	3.0 1.5	150	50	130	3300	2.2	17	23	29	87
TELAN-U6P(1)	54	5.4	10	UC6-12 UC6-24	43	12 24	3.6 1.8	150	61	158	3600	2.6	17	23	29	100
TELAN-U7P(1)	63	6.3	10	UC7-12 UC7-24	50	12 24	4.2 2.1	150	71	185	3600	3.0	17	23	37	114
TELAN-U8P(1)	72	7.2	10	UC8-12 UC8-24	57	12 24	4.8 2.4	150	81	210	3600	3.4	17	23	37	130
TELAN-U9P(1)	81	8.1	10	UC9-12 UC9-24	65	12 24	5.4 2.7	150	91	235	3600	3.8	17	23	45	144
81 to 300 W				69 to 300 W				TELAN units can easily be operated in series to obtain power to 300 W. Ask GI engineers or reps for recommendation or request "TELAN Application Handbook" TEG-12.								

(1) P indicates generator will be shipped with jets for Propane. Substitute "B" for Butane or "N" for Natural Gas jets. Jets can be changed in the field if fuel is changed after generator is installed.

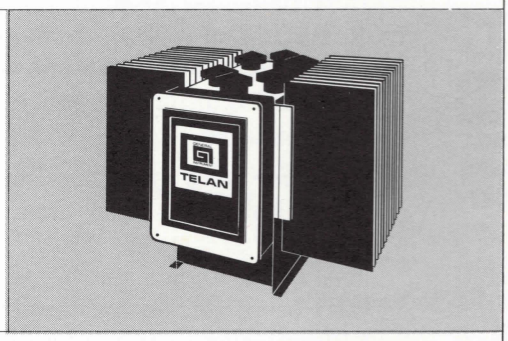
(2) Warranty power at room temperature (70°).

(3) Solid state DC-DC converter with variable voltage limiter. Specify 12 or 24V; variable range 12 to 16V and 24 to 31V.

(4) Without DC-DC converter.

(5) The rectifiers in TELAN DC-DC converters prevent the battery from discharging into the generator. When a unit without converter is used to charge a battery a blocking diode **must** be included to prevent battery discharge thru the TELAN unit.
All generators include gas regulator set to accept 10-30 psi; complete with weatherproof housing and weatherproof electrical convenience box.

GENERAL INSTRUMENT



GENERAL INSTRUMENT CORPORATION

THERMOELECTRIC DIVISION

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TELAN Application Handbook, TEG-12

LaMARCHE

MODEL A-23
MODEL A-25
MODEL A-10

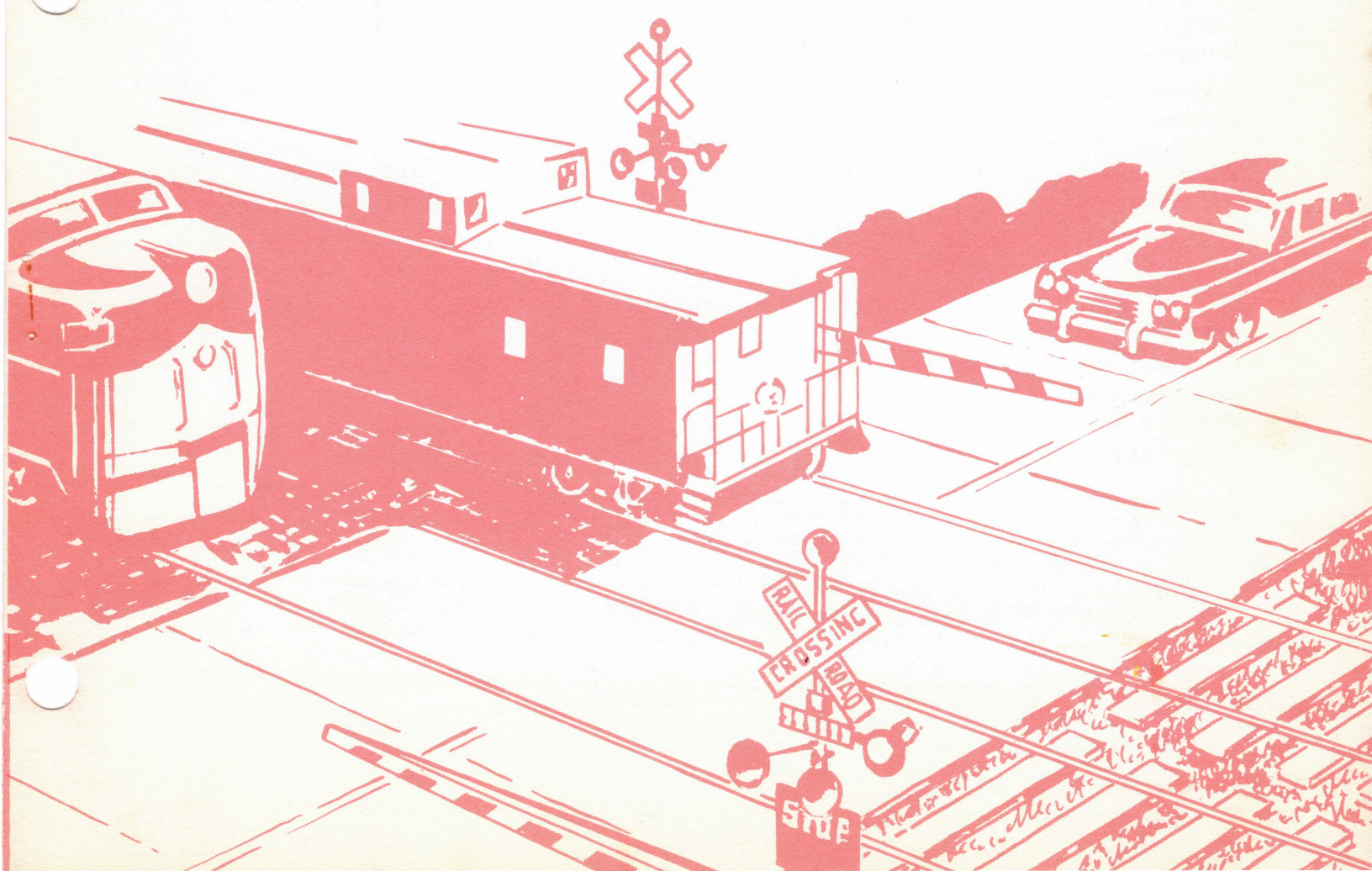
QUALITY EQUIPMENT FOR RAILROAD SIGNAL APPLICATIONS

Constavolt Signamatic

Crossing Gate and Flasher Rectifiers

Interlocking Plant Rectifiers

Track Rectifiers



Crossing Gate and Flasher Rect

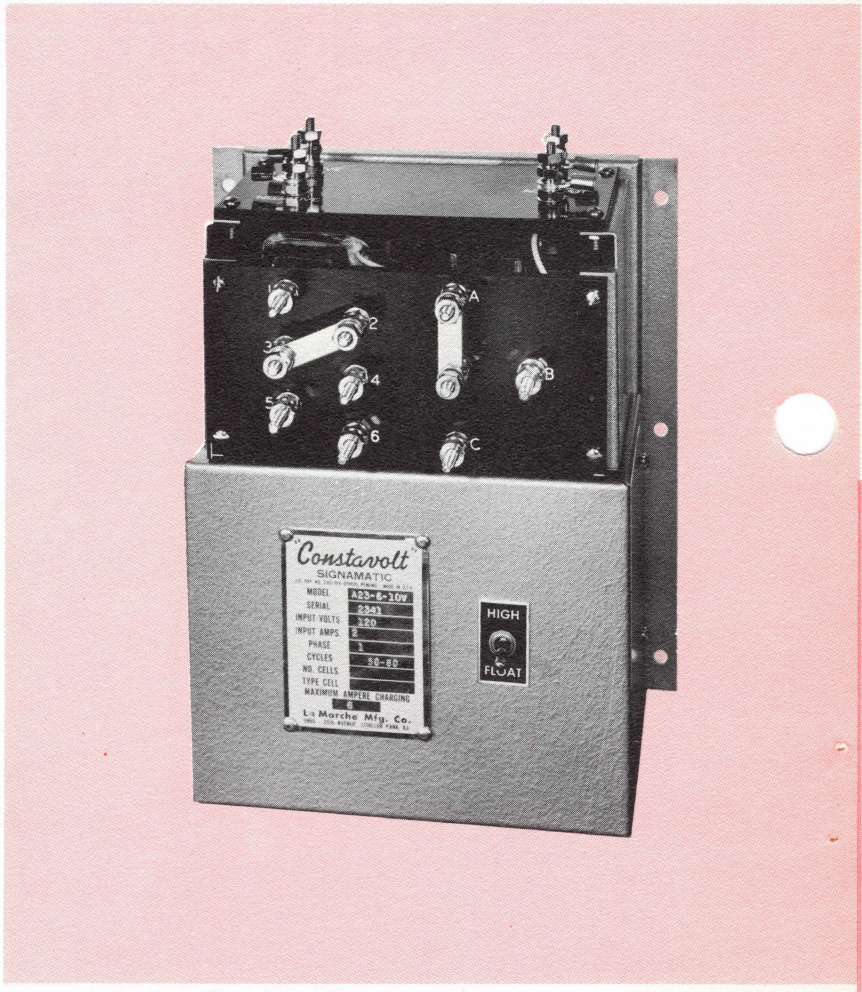
Assures continuous full battery capacity
Designed specifically for railroad service

The La Marche Model A-23 Constavolt has been designed to satisfy the specific electrical needs of railroad crossing gate service. After each partial discharge, the Constavolt's unique output curve supplies a float charge above the normal float voltage. This automatic function of the Constavolt insures full battery capacity at all times. This automatic load regulation is based on a magnetic amplifier and special internal circuits. The system is highly dependable . . . no moving parts such as relays or fans are used in any La Marche Signamatic chargers. Years of service and on-the-job tests have proved that the La Marche method of maintaining batteries used for intermittent loads is far superior to all other present methods.

In normal operation the Constavolt is set to the "Float" position with the "High-Float" control. To equalize cell voltage or recharge the battery in a shorter time, the switch is turned to the "High" position.

The latest Model A-23 chargers offer a wider range of adjustments and operations, with the same high standards of charging characteristics and efficiency.

Constavolt chargers are built to the highest construction standards with AAR terminals on all A-23 and A-25 models.



ORDERING INFORMATION

MODEL NUMBER	D.C. OUTPUT		NUMBER OF CELLS MAINTAINED		
	Nominal Float Voltage	Amps.	Lead Acid	Nickel Iron	Nickel Cad. Vented
A-23-6-10	10	6	5	7	7-8
A-23-6-12	12	6	6	8-9	9
A-23-6-14	14	6	7	10-11	11
A-23-6-16	16	6	8	12	12

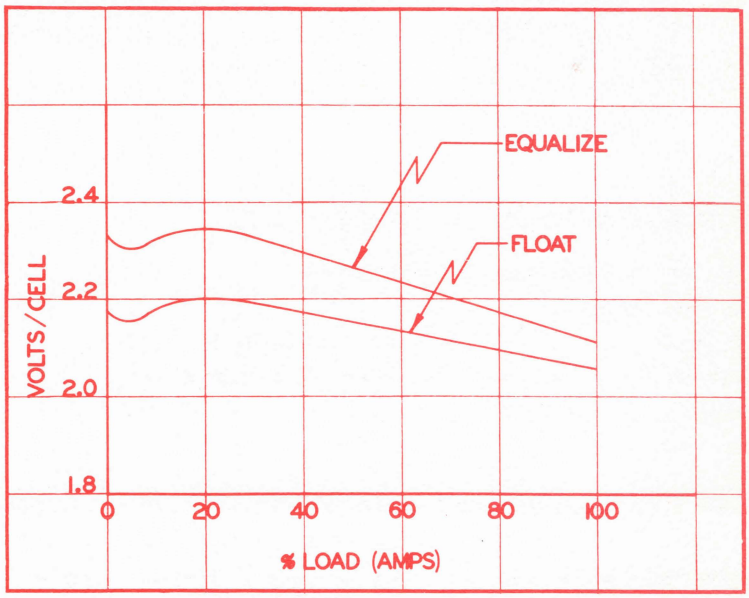
WHEN ORDERING PLEASE SPECIFY:

1. Battery type, number of cells and amp. hour capacity
2. A.C. input voltage, phase and frequency.
3. Continuous current load, if any.
4. Intermittent loads and duration
5. Allowable recharging time from full discharge, where applicable.

SIGNAMATIC

ifiers . . . Model A-23

Output curve shows how CONSTAVOLT provides continuous full battery operation



TYPICAL
OUTPUT VOLTAGE CURVE
OF MODEL A-23
ON LEAD-ACID CELLS

SPECIFICATIONS

A.C. Input:
120 or 240 volts, single phase.
50, 60 or 100 cycles.

D.C. Output:
D.C. Amps. — 6
D.C. Volts* — 10, 12, 14 or 16
*Nominal values, other D.C. voltages available.

Mechanical:
Overall dimensions and mounting as shown at right.
Finish: Bonderized steel with baked silicon enamel, light hammertone gray.
Hardware: AAR terminals

SAMPLE SPECIFICATIONS

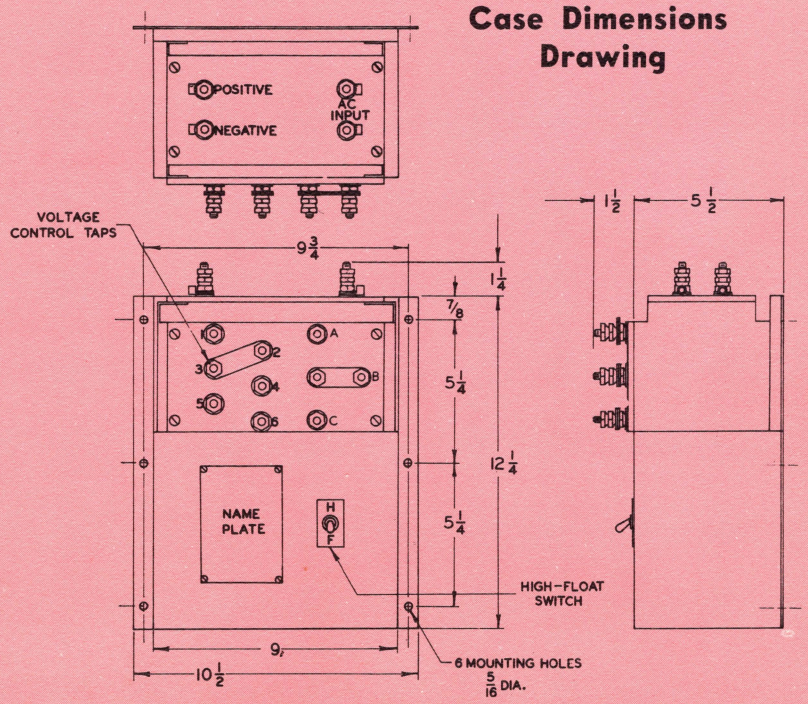
The charger to be furnished shall be the LaMarche Mfg. Co. Model A-23, or approved equal, and shall utilize a voltage output curve which will rise above float voltage, after every load application, before returning the battery to float voltage. A continuous, uninterrupted charge curve shall be run from full amperage output down to float trickle output. No voltage or temperature sensitive relays, switches or circuits shall be employed to obtain the charge curve. This charger shall have:

a. 2 ranges:

	Float	Equalize
Lead-Acid	2.17	2.33
Nickel-Iron	1.5	1.6
Nickel-Cadmium (Vented)	1.4	1.5

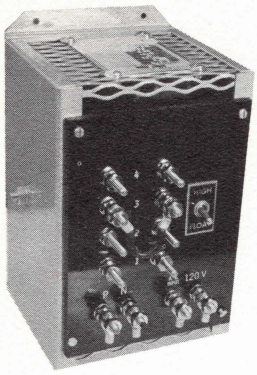
b. Semi-automatic overload protection (current limiting).
c. Selenium full-wave rectifiers.
d. Automatic surge suppressors.
e. Fine and coarse adjusting taps for setting the charger for average line and battery conditions.

Case Dimensions Drawing



CONSTAVOLT SIGNAMATIC

TRACK RECTIFIERS — MODEL A-25

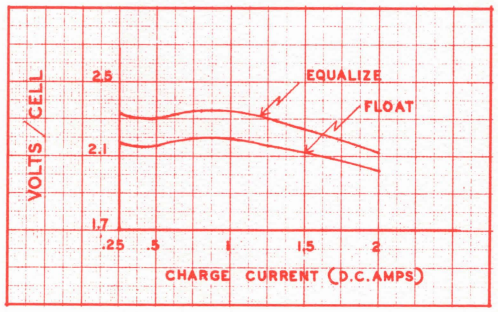


The "CONSTAVOLT" Signamatic track rectifier Model A-25 is designed to cover all types of operation in this service. A high quality selenium full wave bridge rectifier is used in combination with a magnetic amplifier and patented circuitry to maintain the correct voltage under all conditions of service. The Model A-25 circuit assures a long life and trouble-free operation under varying conditions of track resistance. A HIGH-FLOAT switch allows high-rate charging when desired. Output curve adjustment is accomplished with conveniently located taps. Advanced circuit design eliminates the need of resistance adjustment. Terminal hardware is nickel-plated bronze conforming to railroad specifications, and the rectifiers are protected inside and out against corrosion from moisture.

SPECIFICATIONS — MODEL A-25

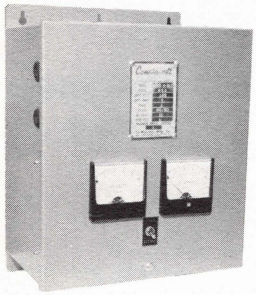
Cells: Lead Acid, Nickel Iron, or Nickel Cadmium

D.C. Amps. Output:	2
A.C. Input:	120 or 240 V.A.C. 50/60 Cycles
Dimensions:	Height 10½", Width 6½", Depth 6"
Weight:	15 lbs.



FLOAT & EQUALIZE CURVES ON LEAD-ACID CELLS

INTERLOCKING PLANT RECTIFIERS — MODEL A-10



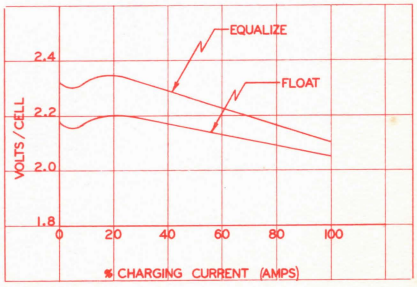
The La Marche Signamatic Model A-10 is designed for railroad applications where the charger remains across the battery, the main load is intermittent and the continuous load is small. Continuous loads of more than 10% capacity must be specified.

A separate size of the Model A-10 is available for each interlocking plant application. Selection is dependent upon voltage and type of battery cells.

The unique output curve is designed for railroad float service and insures that full capacity of the battery is always available.

Like all La Marche chargers built for railroad service, the Model A-10 is designed for years of trouble-free operation.

FLOAT & EQUALIZE CURVES FOR MODEL A-10 ON LEAD-ACID CELLS



SPECIFICATIONS — MODEL A-10

The charger to be furnished shall be the LA MARCHE MFG. CO. Model A-10, or approved equal, and shall utilize a voltage output curve which will rise above float voltage, after every load application, before returning the battery to float voltage. This charger shall have:

a. 2 ranges, FLOAT at 2.17 VPC and EQUALIZE at 2.33 VPC with the FLOAT setting adjustable.
b. Semi-automatic overload protection (current limiting).
c. Silicon diode full-wave rectifiers.
d. Automatic surge suppressors.
e. Compensation taps for setting the charger for average line and battery conditions.

La mpany

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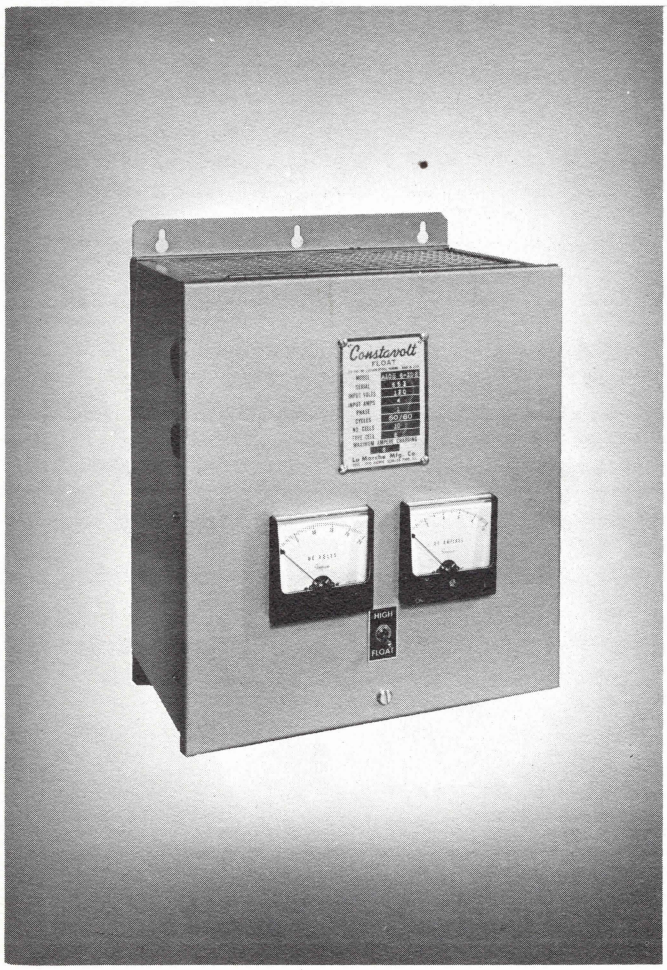
La MARCHE

Model A-10

FOR FLOAT SERVICE WHERE THE MAIN LOAD IS INTERMITTENT AND THE CONTINUOUS LOAD IS NOT MORE THAN 10% OF THE CHARGERS RATED OUTPUT

MANUFACTURERS AND ORIGINATORS OF THE WORLD'S MOST COMPLETE LINE OF BATTERY CHARGERS



GENERAL DESCRIPTION

The Model A-10 is one of the precision La Marche "Constavolt" battery chargers designed for float and engine starting applications. Specifically intended for applications where the charger remains connected across the battery at all times, the main load is intermittent and the continuous load is not more than ten percent of the charger's maximum rated output.

A separate size of the Model A-10 is available for each voltage application dependent on the number and type of battery cells used. The unique output curve, designed specifically for float service, insures that the battery is charged with a voltage above the standard float voltage, after each partial discharge, before it is permitted to drop back to the normal float voltage. This automatic function of the Model A-10 insures that the full capacity of the battery is always available. Tests have proven this method of maintaining batteries far superior to previous methods.

A precision voltmeter, ammeter and equalization switch are standard on the Model A-10. The equalization switch allows the charging rate to be increased from 2.15 volts per lead-acid cell to 2.33 volts, for cell equalization or when a higher charging rate is desired.

La Marche "Constavolt" chargers are designed for years of trouble-free continuous service. They have no voltage sensitive relays, contacts, fans or other moving parts requiring service. Load regulation is accomplished by use of the magnetic amplifier principle together with special circuitry eliminating the need for tubes, relays and other short-lived components.

DESIGN FEATURES

1. **Quality parts throughout. Hermetically sealed silicon diode rectifiers and magnetic amplifiers used exclusively. No aging adjustments.**
2. **Output voltmeter/ammeter and fused input-output are standard on all Model A-10 chargers.**
3. **Over fifty sizes available in five input voltages.**
4. **Float/equalize control located on face panel for easy operation.**
5. **Design and operation tested and approved by battery manufacturers, utilities, railroads and military.**

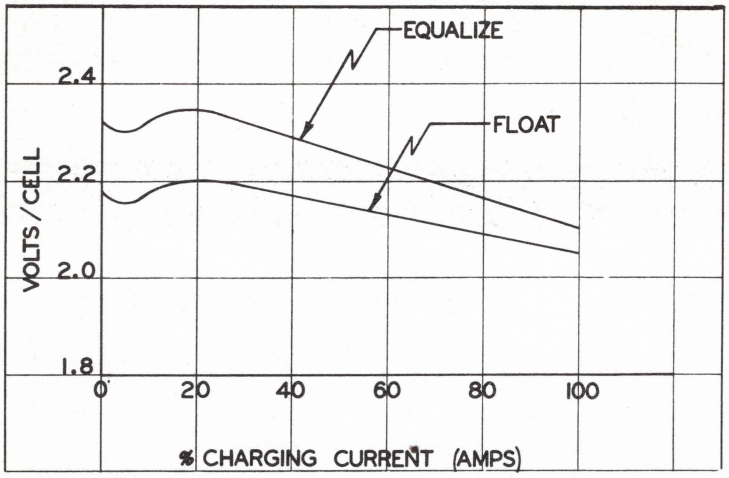
BATTERY CHARGERS, D.C. TO A.C. INVERTERS, AND
D.C. POWER SUPPLIES FOR ALL APPLICATIONS

Supersedes Data Sheet 10506

#10507 Effective Sept. 1, 1966

Printed in U.S.A.

FLOAT AND EQUALIZE CURVES FOR MODEL A-10



WHEN ORDERING PLEASE SPECIFY:

1. La Marche model number A-10
2. Input voltage, cycles, phase
3. Number and type of battery cells
4. Ampere hour capacity of battery
5. Intermittent D.C. loads and duration
6. Continuous D.C. load
7. Allowable recharging time from full discharge where applicable

SPECIFICATIONS

ELECTRICAL:

A.C. INPUT VOLTAGES:

120, 208, 240, 480 or 550 single phase, 60 cycles
208, 240, 480 or 550 three phase, 60 cycles

D.C. OUTPUT COMBINATIONS AVAILABLE:

D.C. amps. - 6, 10, 20, 30, 40, 50, 60, 75, 100, or 150

D.C. volts* - 12, 24, 36, 48, 130, or 260

*Nominal values, other D.C. voltages available.

MECHANICAL:

Overall dimensions and approximate shipping weights are listed on A-10 price sheet. Case specifications are subject to change and where space requirements are critical it is best to check the plant for latest dimensions.

FINISH: Bonderized steel painted with light gray silicon baked enamel.

MOUNTING: Mounting flanges are supplied as part of the cabinet back plate on wall mounted units.

STANDARD ACCESSORIES SUPPLIED:

1. Quality D.C. ammeter and voltmeter.
2. Compensation taps for setting the charger for average A.C. line and battery conditions.
3. Fused A. C. input and D.C. output for complete protection.
4. Convenient switch to transfer from float charge to high rate equalize charge.
5. Internal terminal board for easy connection of A.C. input, D.C. output and compensating taps.

OPTIONAL ACCESSORIES (at additional cost):

1. Single pole A.C. Circuit breaker replacing fuse
2. 0-24 hour equalizing timer
3. Ground detection switch
4. Low D.C. votlage alarm relay
5. High D.C. voltage alarm relay
6. Special paint
7. Export packing
8. Dual fusing for A.C. input and D.C. output replacing single input and output fusing
9. D.C. cranking relay to disconnect A.C. input for overload protection.

SAMPLE SPECIFICATIONS FOR MODEL A-10

The charger to be furnished shall be the La Marche Mfg. Co. Model A-10 or approved equal submitted for inspection. The charger shall employ a magnetic amplifier and isolation power transformer to provide a voltage output curve which will rise above float voltage, after every load application, before returning the battery to float voltage. This charger shall have:

1. 2 ranges, Float at 2.17 V.P.C. and Equilize at 2.33 V.P.C. on lead-acid batteries.
2. Automatic load regulation.
3. Semi-automatic overload protection (current limiting).
4. Automatic D.C. voltage regulation.
5. Hermetically sealed silicon diode full-wave rectifiers.
6. Automatic surge suppressor.
7. Precision D.C. ammeter and voltmeter.
8. Fused A.C. input and D.C. output.

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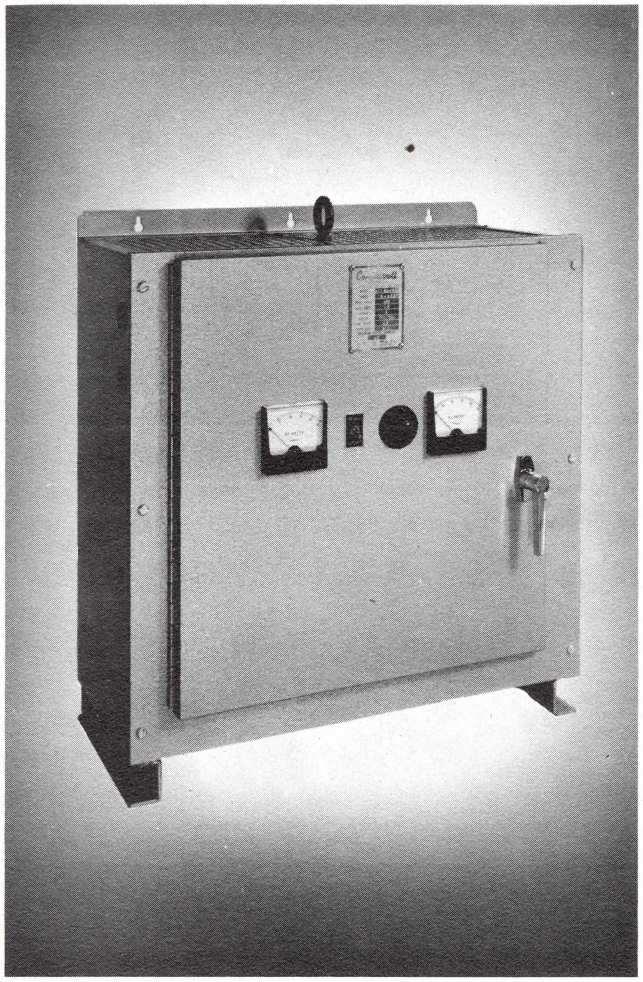
LaMARCHE

MODEL A-11

MANUFACTURERS AND ORIGINATORS OF THE WORLD'S MOST COMPLETE LINE OF BATTERY CHARGERS



GENERAL DESCRIPTION

The model A-11 Float Battery Charger is a completely automatic, solid state, constant voltage device having:

A.C. VOLTAGE COMPENSATION
D.C. VOLTAGE REGULATION
CURRENT LIMITING

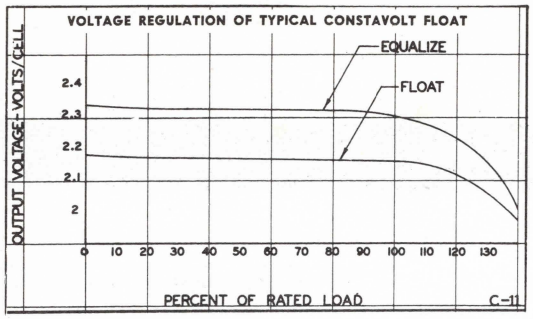
The model (A-11) charger is designed and built to carry continuous and intermittent loads up to its maximum rated output. The A-11 is current limited at 140% of rated output. Each unit is designed and built to charge a specific type of battery containing a specific number of cells.

The La Marche Transistor Controlled magnetic- amplifier circuits provide continuous taper charging. Maintains rated output voltage within ±1% from no load to full load with A.C. input variations of ±10%. Silicon diodes are used for rectification.

The model A-11 charger floats lead-acid batteries at 2.17 volts per cell and by means of a front panel switch equalizes at 2.33 volts per cell. Both float and equalize voltages are adjustable to meet battery manufacturers recommendations. This type of charging imparts the longest battery life and is the accepted method for charging batteries used in stand-by service.

DESIGN FEATURES

1. Quality parts throughout. Silicon diode rectifiers and transistor magnetic amplifiers used exclusively. No aging adjustments.
2. A.C. power loss relay, output voltmeter/ammeter and fused input-output are standard on all models.
3. Eighty sizes available in five input voltages.
4. Adjustable equalize and float levels; float/equalize controls located on face panel for easy operation.
5. Design and operation tested and approved by battery manufacturers, utilities, railroads and military.



ORDERING INFORMATION:

When ordering please specify:

1. La Marche Model Number A-11
2. Input Voltage, Cycles, Phase
3. Number and Type of Battery Cells
4. Ampere Hour Capacity of Battery
5. Intermittent D. C. Loads and Duration
6. Continuous D.C. Load
7. Allowable Recharging Time from Full Discharge where Applicable

SPECIFICATIONS

ELECTRICAL:

A.C. INPUT VOLTAGES:
120, 208, 240, 480 or 550 single phase, 60 cycles
208, 240, 480 or 550 three phase, 60 cycles

D.C. OUTPUT COMBINATIONS AVAILABLE:
D.C. amps. - 3 to 250
D.C. volts* - 6, 12, 24, 30, 36, 48, 130, or 260
*Nominal values, other D.C. voltages available.

MECHANICAL:

Overall dimensions and approximate shipping weights are listed on A-11 price sheet. Case specifications are subject to change and where space requirements are critical it is best to check the plant for latest dimensions.

FINISH: Bonderized steel painted with light gray silicon baked enamel.

MOUNTING: Mounting flanges are supplied as part of the cabinet back plate on wall mounted units.

STANDARD ACCESSORIES SUPPLIED:

1. Potentiometer for desired float and equalize charge voltage adjustments.
2. Quality D.C. ammeter and voltmeter with 50 millivolt movement, 2% accuracy.
3. Power failure relay with terminals for connections to a remote alarm system.
4. Fused A.C. input and D.C. output for complete protection.
5. Convenient switch to transfer from float charge to high rate equalize charge.
6. Internal terminal board for easy connection of A.C. input, D.C. output and power failure equipment.

OPTIONAL ACCESSORIES:

1. A.C. circuit breaker replacing fuse.
2. 0-24 hour equalizing timer.
3. Ground detection switch.
4. Low D.C. voltage alarm relay.
5. High D.C. voltage alarm relay.
6. Special paint.
7. Export packing add 5%.
8. Individual float/equalize adjustments, specify model A-11B.
9. Filtered units available, see model A-12.
10. Dual fusing for A.C. input and D.C. output replacing single input and output fusing.
11. Dual voltage A.C. input.
12. 1% taut band meters replacing 2% meters.
13. Relay rack mounting.

SAMPLE SPECIFICATIONS FOR MODEL A-11

The charger to be furnished shall be the La Marche Mfg. Co. Model A-11 or approved equal. The charger shall employ transistor controlled magnetic amplifier circuits to provide continuous taper charging. This charger shall maintain rated output voltage within ±1% from no load to full load with A.C. input variations of ±10%. This charger shall have:

1. 2 ranges, Float at 2.17 V.P.C. and Equalize at 2.33 V.P.C. on lead-acid batteries. Both settings adjustable from face of panel.
2. Automatic A.C. line compensation
3. Automatic overload protection (current limiting).
4. Automatic D.C. voltage regulation.
5. Silicon diode full-wave rectifiers.
6. Automatic surge supressors.
7. Power failure relay with remote indication connecting terminals.
8. D.C. ammeter and voltmeter with 50 millivolt movement, 2% accuracy.
9. Fused A.C. input and D.C. output.

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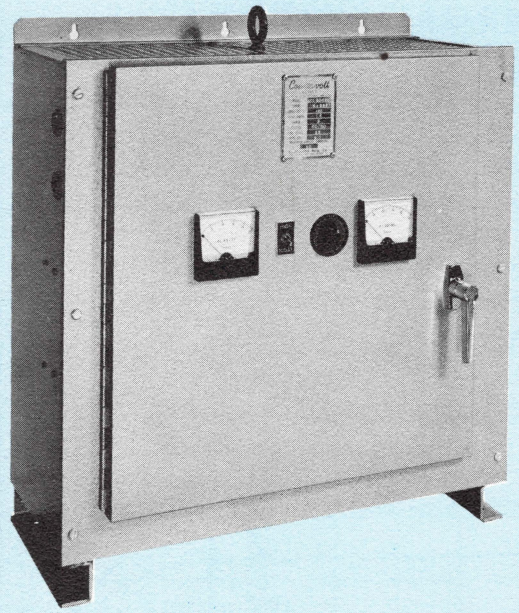
LaMARCHE

FILTERED FLOAT BATTERY CHARGERS

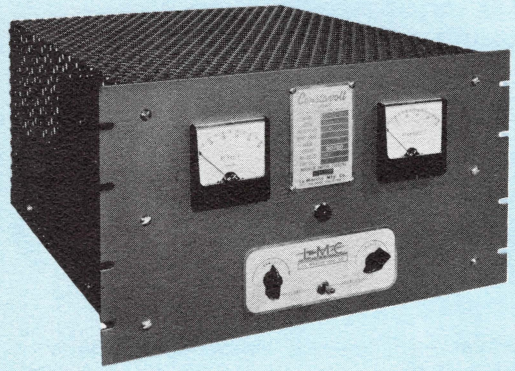
Model A-12

FOR MICROWAVE AND TELEPHONE APPLICATIONS

MANUFACTURERS AND ORIGINATORS OF THE WORLD'S MOST COMPLETE LINE OF BATTERY CHARGERS



NO. 6 CASE WALL OR FLOOR MOUNTED



19" RELAY RACK CASE

Filtered Float Battery Charger

The model (A-12) charger is a solid state, fully automatic, constant voltage battery charger designed for communications applications.

Standard features include, A.C. line compensation, D.C. voltage regulation and current limiting. The La Marche transistor controlled magnetic amplifier circuit is designed to automatically float and charge stationary batteries with D.C. output regulation of ±1% from no load to full rated output. Accurate output regulation is maintained with A.C. line variations of ±10%.

The A-12 is offered in a wide range of sizes for lead acid, nickel-cadmium and nickel iron batteries.

The reliability of the La Marche circuit has led to its selection for critical communication and control systems, nuclear powered ships, missile firing stations, and utility power standby systems.

DESIGN FEATURES:

- ★ **Hermetically sealed silicon diode rectifiers.**
- ★ **Current limiting circuit.**
- ★ **Automatic A.C. voltage compensation.**
- ★ **D.C. voltage regulation.**
- ★ **Output ammeter and voltmeter.**
- ★ **Fused A.C. input and D.C. output.**
- ★ **Float/equalize toggle switch and rheostat adjustment.**
- ★ **A.C. power loss relay.**

SAMPLE SPECIFICATIONS FOR MODEL A-12

The charger to be furnished shall be of the full wave rectifier type, La Marche Mfg. Co. Model A-12 or approved equal. The charger shall employ a transistor controlled magnetic amplifier circuit and shall maintain rated output voltage within ±1% from no load to full load, with A.C. input variations of ±10%.

The charger shall be capable of operating at a rated current continuously at an ambient temperature of 40 C 140 F.

The charger shall be convection cooled in a ventilated steel enclosure and painted a gray color.

This charger shall have:

1. Two ranges for charging Lead Acid, Nickel Cadmium or Nickel Iron cells. Both Float and Equalize settings adjustable ±5% by potentiometer on the front panel of the charger.
2. Automatic A.C. line compensation.
3. Automatic current limiting protection.
4. Automatic D.C. voltage regulation.
5. Hermetically sealed silicon diode rectifiers.
6. Automatic surge suppressors.
7. A.C. power failure relay with remote indication connecting terminals.
8. D.C. ammeter and voltmeter with 50 millivolt movement 2% accuracy.
9. Fused A.C. input and D.C. output.
10. Filtered to 100MV-RMS or less, measured on the battery.

WHEN ORDERING PLEASE SPECIFY:

1. **La Marche model number A-12**
2. **A.C. input voltage, cycles, phase**
3. **Number and type of battery cells**
4. **Ampere hour capacity of battery**
5. **Intermittent D.C. loads and duration**
6. **Continuous D.C. load**
7. **Allowable recharging time from full discharge where applicable**
8. **Amount of filtering—measured how?**

GENERAL INFORMATION

ELECTRICAL:

A.C. INPUT VOLTAGES:

120, 208, 240, 480 or 550 single phase, 60 cycles, 208, 240, 480 or 550 three phase, 60 cycles

D.C. OUTPUT COMBINATIONS AVAILABLE:

12 through 230 volts D.C.

3 through 400 amps D.C. — For lead-acid, nickel-cadmium and nickel-iron cells.

MECHANICAL:

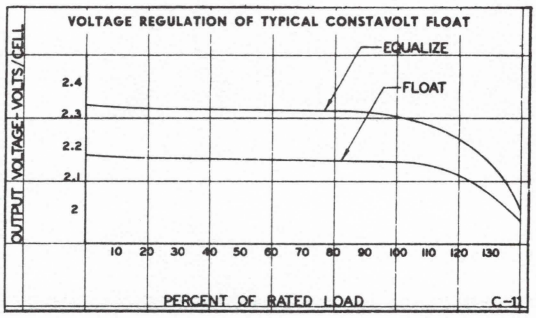
FINISH: Bonderized steel painted with light gray silicon baked enamel.

MOUNTING: Mounting flanges are supplied as part of the cabinet back plate on wall mounted units.

Case specifications are subject to change and where space requirements are critical it is best to check the plant for latest dimensions.

STANDARD ACCESSORIES SUPPLIED:

1. Potentiometer for desired float and equalize charge voltage adjustments.
2. Quality D.C. ammeter and voltmeter with 50 millivolt movement, 2% accuracy.
3. Power failure relay with terminals for connections to a remote alarm system.
4. Fused A.C. input and D.C. output for complete protection.
5. Convenient switch to transfer from float charge to high rate equalize charge.
6. Internal terminal board for easy connection of A.C. input, D.C. output and power failure equipment.



OPTIONAL ACCESSORIES:

(at additional charge)

1. A.C. and D.C. circuit breakers replacing fuse
2. 0-24 hour equalizing timer
3. Ground detection switch
4. Low D.C. voltage alarm relay
5. High D.C. voltage alarm relay
6. Special paint
7. Export packing add 5%
8. Individual float/equalize adjustments, specify model A-12B
9. Dual fusing for A.C. input and D.C. output replacing single input and output fusing
10. Glyptol dip
11. A.C. pilot light
12. Remote meters and controls
13. Relay rack mounting

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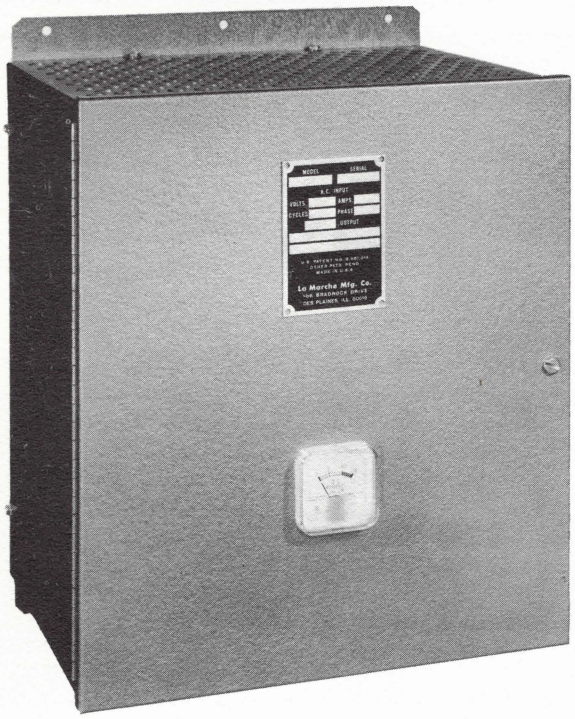
LaMARCHE

Model A-26

FILTERED D.C. POWER SUPPLY

MANUFACTURERS AND ORIGINATORS OF THE WORLD'S MOST COMPLETE LINE OF RECTIFIERS



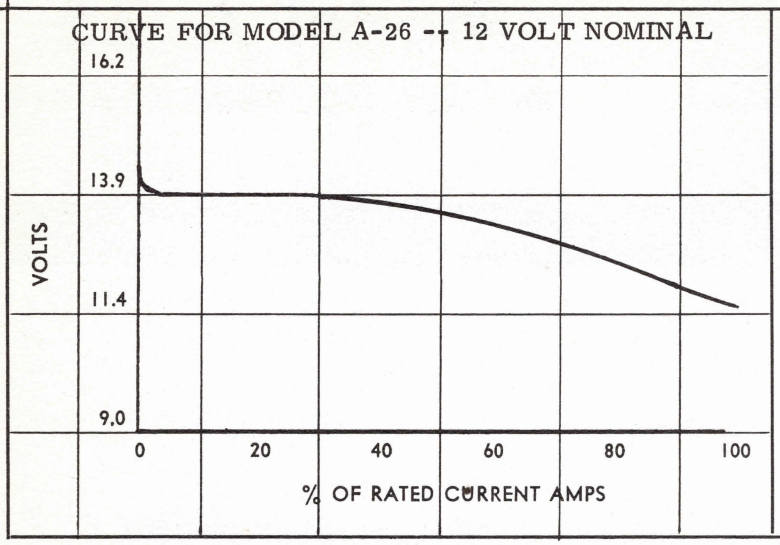
GENERAL DESCRIPTION

The La Marche A-26 power supply features automatic load regulation and semi-automatic current limiting. The model A-26 is filtered to 10% ripple. There are no controls to be set for different applications because the amount of loading determines the current output.

The La Marche model A-26, like all La Marche units, is a solid state device employing a balanced isolation power transformer, a magnetic amplifier and sealed silicon diode rectifiers. These power supplies have no contacts, relays, switches, fans, tubes, time clocks or other moving parts.

DESIGN FEATURES

1. Automatic in operation and self-regulating.
2. No moving parts. Nothing to arc or wear out.
3. No external controls. Cannot be tampered with.
4. Complete isolation of the AC line from the DC circuit eliminates the problem of fuse blowing on grounded equipment and the danger of high voltage shock to personnel on ungrounded equipment.



WHEN ORDERING PLEASE SPECIFY:

1. La Marche model No. A-26
2. Input voltage, cycles, phase
3. Intermittent D.C. loads and duration
4. Continuous D.C. load

GENERAL INFORMATION

ELECTRICAL:

A.C. INPUT VOLTAGES:

120, 208, 240, 480 or 550 single phase, 60 cycles, 208, 240, 480 or 550 three phase, 60 cycles

D.C. OUTPUT COMBINATIONS AVAILABLE:

D.C. VOLTS*	D.C. AMPS 5	10	20	30	40	60	75	85	105	130	160	200	250
12	X	X	X	X	X	X	X	X	X	X	X	X	X
24	X	X	X	X	X	X	X	X	X	X	X	X	X
36	X	X	X	X	X	X	X	X	X	X	X	X	X
48	X	X	X	X	X	X	X	X	X	X	X	X	X
130	X	X	X	X	X	X	X	X	X	X			
260	X	X	X	X	X	X							

*Nominal values, other D.C. voltages available.

AVAILABLE IN 3 PHASE A.C. INPUT AS STANDARD

MECHANICAL:

Overall dimensions and approximate shipping weights are listed on the price sheet. Case specifications are subject to change and where space requirements are critical it is best to check the plant for latest dimensions.

FINISH: Bonderized steel painted with light gray silicon baked enamel.

MOUNTING: Mounting flanges are supplied as part of the cabinet back plate on wall mounted units.

OPTIONAL ACCESSORIES (at additional cost):

1. A.C. circuit breaker replacing fuse.
2. Ground detection switch
3. Low D.C. voltage alarm relay
4. High D.C. voltage alarm relay
5. Special paint
6. A.C. power failure alarm relay

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LaMARCHE

TECHNICAL OPERATION OF THE LA MARCHE SELF REGULATED AUTOMATIC AC LINE COMPENSATED FLOAT BATTERY CHARGER

INSTALLATION

To operate the charger it is only necessary to connect the AC power to the charger and the DC output cables to the battery. Before connecting the power or battery leads to the charger be certain the nomenclature on the name plate of the charger agrees with the incoming power and the battery type and number of cells.

When a battery is discharged or standing idle its terminal voltage will be less than its on charge float or equalize voltage. Therefore, when the charger is put into operation it will immediately begin to charge the battery. The charger will charge the battery at its rated output to a pre-determined voltage. When this voltage is reached the charge rate will begin to taper to a trickle charge of a magnitude necessary to maintain the battery voltage at its pre-determined setting. It is necessary to trickle charge the battery at a very low rate in order to keep the battery fully charged. Therefore, after the charger has brought the battery to full charge it shuts down to a small continuous charge preserving charge.

CHARGER COMPONENTS

The charger has four (4) basic components, a Transformer, Saturable Reactor, Silicon Rectifier Stacks, and Control Unit. The basic operation of these units is as follows:

The Transformer transforms the incoming A.C. voltage to the required level to charge the battery. The transformer also isolates the incoming power from the output. The Saturable Reactor regulates the power output of the transformer continuously over the charge cycle. The Rectifier Stacks are made up of silicon diodes connected in a full wave center tap or full wave bridge configuration. These silicon diodes rectify the secondary AC power to DC power. The control senses the condition of the battery and controls the reactor which in turn regulates the power output of the transformer.

The standard float charger is provided with a potentiometer for adjusting the float and equalizing voltage level and a float/equalize switch for transferring the output of the charger from float charge to equalize charge. Dual pots for independently adjusting the float and equalizing points are provided as an additional option. A 24 hour equalizing timer may be provided in place of the manual float/equalize switch as an additional option. The time switch is set at a pre-determined setting (usually 24 hours) and when the timer times out, the charger is automatically returned to the float position.

BATTERY CELL TYPES AND VOLTAGES

The La Marche Float Chargers are designed specifically to charge lead acid, nickel cadmium or nickel iron batteries. These chargers float the batteries at 2.17 volts per cell (lead acid), 1.4 volts per cell (nickel cadmium), or 1.5 volts per cell (nickel iron or Edison). The equalizing charge setting for the batteries are 2.33 volts per cell (lead acid), 1.55 volts per cell (nickel cadmium), or 1.6 volts per cell (nickel iron). The potentiometer adjustment allows for a $\pm$ 5% adjustment from the nominal float/equalize voltages. The charger name plate indicates the type of battery and the number of cells the charger is designed to charge.

OPERATION

Upon installation the charger will charge at its maximum rate and taper to a trickle charge at the battery float voltage. The desired float voltage may be obtained by adjusting the potentiometer. The battery should then be given a 24 hour freshening charge by putting the float/equalize switch in the equalizing position to make certain the battery is fully charged. The unit should then be returned to the float position for normal operation.

AUTOMATIC CHARGE CONTROLS

The charge rate is completely controlled by the saturable reactor and sensing control. The battery voltage is sensed by a zener diode. The zener diode conducts into the base of a transistor and the transistor operates to shunt the saturating coil of the reactor. When the battery is discharged the battery voltage is low and the reactor saturating coil saturates the reactor. The impedance change of the reactor due to the core saturating shifts more voltage to the primary of the transformer which in turn increases the induced voltage in the secondary of the transformer, thus, increasing the charge rate to maximum rated output. When the battery voltage reaches its float voltage the control begins to operate to reduce the charge rate. The zener diode sensor begins to conduct into the transistor regulator and begins to shunt the current from the saturating coil of the reactor. The reactor begins to de-saturate increasing the impedance, and the voltage to the transformer primary begins to drop, thus decerasing the output.

A voltage divider across the output terminals of the charger provides the battery reference voltage to the zener diode. On single potentiometer units a voltage divider is provided with two reference slider band adjustments. Dual potentiometer units have separate voltage dividers with one slider band adjustment on the float divider and the other on the equalizing divider. If the potentiometer does not give the required float or equalizing points the slider bands may be adjusted to give the required operating voltage.

AC LINE COMPENSATION

The float charger has a specially designed transformer-reactor combination which inherently compensates for variations in the incoming AC power. The impedance balance of the transformer-reactor combination compensates for a line voltage variation of ±10% of the nominal AC voltage specified on the name plate.

AUTOMATIC CURRENT LIMITING

The float charger will charge to its maximum current capacity and begin to current limit if overloaded. The automatic current limiting feature limits the output of the charger to a maximum of 140% rated load. The saturating current resistor is pre-set and factory adjusted to the required current limiting. The current limiting is accomplished by limiting the saturating current to the reactor, thus controlling the output of the unit.

AC POWER FAILURE

A power failure relay is provided to disconnect the automatic control from the battery and therefore eliminate any drain on the battery. One set of normally closed contacts from this relay is connected to terminals for connection to a remote power failure alarm. The charger will automatically resume charging upon return of AC power.

MAINTENANCE

It should not be necessary to make any adjustments to the La Marche Float Charger except for adjusting the potentiometer to the desired float or equalizing points. Should any further adjustment be necessary extreme care should be taken in making the adjustment. Because of the stable, rugged, and static design of this unit very little maintenance is required. Occasional blowing out of dust and tightening of connections are the only maintenance requirements.

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MANUFACTURERS AND ORIGINATORS OF THE WORLD'S MOST COMPLETE LINE OF MAG-AMP. REGULATED AUTOMATIC BATTERY CHARGERS

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